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PROF. CHANDLER, president of the Board of Health of the city of New York, has given some interesting testimony as to the proper disposition to be made of the large amount of garbage and street-sweepings which is or ought to be collected in the process of cleansing great towns. In New York this question appears to be more serious than elsewhere, because the insulated character of the city seems hitherto to have left no practicable alternative as to the disposal of these foul masses when collected, except to empty them into the sea, there gradually to fill up the channels, or thence to be brought back by the tides, and washed ashore on the north and south sides of the harbor, — a most dangerous and objectionable result. This also involves great expense in the establishment and maintenance of numerous scows and tugs. An analysis of street refuse from thirteen widely separated and fairly representative districts in the city presented the following average results: of water, 3.032 per cent; of combustible matter, 28.454 per cent; of incombustible matter, 68.514 per cent; of nitrogen, 0.369 per cent. Prof. Chandler testifies that if this organic matter were to be submitted to a heat of 112 degrees, the process of decomposition would be arrested; but that when the matter became moist again, decomposition would be resumed. A temperature of 500 degrees, however, would kill all animal and vegetable life in the mass; would render it perfectly harmless and as fit for filling-in purposes as fire ashes. Prof. Chandler, therefore, in the interest of public health, urges the establishment of a system of garbage cremation in furnaces similar to those used for the manufacture of shell-lime. One inventor claims that in his furnace, costing with all its appliances not more than $5,000, by the burning of three or four tons of cheap "slack," or coal-dust, two hundred tons of street refuse and garbage can be "cremated" and rendered innocuous in twenty-four hours. Some such system as this apparently would not only involve far less cost than the objectionable practice of conveying the sewage to deep water, as in New York, but would render the "dumping-grounds" of all great cities far more consistent with the just demands of civilization and public safety.

THE recent excavations of Dr. Schliemann on the sites of ancient Troy and Mycenæ, and the similar explorations which have been carried on at Rome for many years, as well as the occasional accidental exhumation of Roman pavements and villa sites in the older towns of England, to which our attention is drawn at frequent intervals, — all these point to the fact that in the progress of centuries the grades of cities are insensibly raised, even to the extent of the complete obliteration of old landmarks, by the natural accumulations of such rubbish as in modern phrase is called street-sweepings. There are, of course, the accidents of warfare and fire, which may have increased these deposits unduly at certain times; but it is consistent with our own observations, in the neighborhood even of modern cities, and in the course of no more than fifty years, that the street deposits, from whatever cause and frequently without intention, are sufficient seriously to change the natural surfaces of the ground. The winds, which should purify the streets of these cities in sweeping over such districts, must often take up their foul emanations and vapors, and carry with them to the inhabitants the seeds of disease and death. Not only the proper purification but the proper deposit of such great accretions therefore in the vicinity of crowded cities are matters worthy of careful consideration on the part of all those interested in sanitary science. The city government of Boston has, by a recent vote, concluded to purchase a hundred acres of marsh land partially under water, and lying between the peninsula on which the city is built and the main land on the west. This marsh land has of late years become a serious nuisance, by reason of the accumulation of noisome matter left upon it from the sewerage of a large neighboring district. To raise and drain this land and cultivate it as a public park is doubtless a measure of wise economy. But if, as has been suggested, the grading of it is to be partially effected by the deposit of all the street sweepings of the city, it is to be hoped that the Department of Health will provide that such dangerous accumulations are rendered properly innocuous. It is true that in Boston house-offal is carefully distinguished from the garbage and rubbish of the streets, and separately disposed of; but, as is shown by the analysis of the street sweepings in New York, enough gas-producing substances remain to call for especial care in appointing their manner and places of deposit.

WE learn from our Chicago exchanges that the pollution of the lake water by the city drainage has so far extended that the water supply, which, as is well known, is drawn from Lake Michigan through a tunnel carried far out to deep water, has become seriously affected. Prof. Piper draws attention to the discovery in water, taken from the hydrants, of foreign and deleterious matters, among others of certain spores or eggs which he considers dangerous to the health of the community, in the same manner as the spores of the *bothriocephalus*, a certain worm which formerly was the cause of serious diseases among the inhabitants of the shores of the Lake of Geneva, but which entirely disappeared when those waters were purified by the application of various sanitary appliances to the drainage of the bordering towns, notably by changes in the construction of water-closets, which, up to that time, had emptied themselves into the lake. At present the refuse of the towns is carefully collected for the purpose of manuring the land, and many of the former local forms of disease are now unknown. In like manner, as Prof. Tyndall has observed, in the district of Novgorod, in Russia, between the years 1867 and 1870, 828 human beings and 56,000 horses, cattle, and sheep perished by the drinking of water containing the spores of the *bacillus anthracis*. But lest those who are not habitual water-drinkers may derive some comfort from these unsavory statements, Prof. Piper assures his fellow-citizens that the same water in the form of beer or mixed with whiskey is even more deleterious, and that those who indulge in such beverages are the first to succumb to the forms of disease which are generated by these causes.

THE death of Thomas Bellamy, a Fellow of the Royal Institute of British Architects, was noticed at the meeting of May 28. He died on July 10, in the seventy-eighth year of his age. His practice was not large, but his works were remarkable for careful and elaborate study and great refinement of detail. In his most impressionable years he was under the influence and discipline of that form of Greek revival which arose in England on the publication of Stuart and Revett's "Athens," and of the works of the famous Dilettanti Society, — a discipline which unfortunately these later fashions of picturesque and loose mediævalism are not apt to furnish to the young aspirant.

THE preliminary investigations as to the character of the chalk formations underlying the British Channel seem to have verified the forebodings of those who considered the

submarine tunnel between England and France impracticable by reason of fissures which would be discovered in the stratum. The realization of these forebodings is a disastrous blow to any such method of inter-communication as this; and therefore public attention begins to be turned to the various more familiar and more practicable *open-air* methods which have been suggested by various engineers on either side of the water. Among these, that which seems at present to obtain the greatest favor is the project of M. Verard de St. Anne, who proposes to construct a bridge twenty-one miles long, connecting the opposite points of Folkestone and Cape Grisnez; between these points certain banks called "the Varne" and "the Calbart," much dreaded by navigators, offer admirable facilities for the construction of piers, the ground being strong and calcareous. The former bank is about six miles long, and lies midway between the two points, with the deep channel on either side. M. Chevalier's tunnel was to have been dug at a depth of 410 feet below the channel, was to have been 34½ miles in length, and was to have cost twenty million pounds. The bridge enterprise is set down to cost only twelve millions. The advantages of shortness, practicability, and cheapness, therefore, seem to be certainly in favor of the open-air project. The proposition of M. Verard de St. Anne includes the establishment of a harbor of refuge in mid-channel on the Varne. A company has already been formed, with the object of giving greater extension to the preparatory scientific investigations necessary to the completion of this gigantic bridge.

THE discussion in the Institute of British Architects at its sessions of May 28 and June 11, over Mr. J. J. Stevenson's paper on Architectural Restorations, extracts from which were printed in our last number, aroused that decorous assembly into unwonted emotions. The paper in question presented the views of the extremists, and in especial arraigned Sir Gilbert Scott and Mr. Street for obliterating more or less completely, by processes of restoration, many precious historical monuments. It called upon them to content themselves with keeping the old churches in repair without destroying the evidence of age; and to leave untouched the successive works in the same building, although incongruous and of varying styles, without attempting to discriminate between them, or trying to obtain an effect of unity by the destruction of such historical records, whether expressed in good or bad art. Both of these architects, in their spirited replies, claimed to be among the most conservative of their kind. That of Sir Gilbert, although not wanting in personalities, and very earnest in its tone, seems in the main dignified and good-humored. It abounds in entertaining examples of misused churches which had been allowed to fall down through a neglect which he called contemptuous; or had been divided by glass partitions and other anachronisms; or absorbed in huge high pews, the "dozing-pens" of the squires. He referred, among others, to Llandaff Cathedral, which was "converted" in the last century by Mr. Wood of Bath, who had just erected the "Pump-room" there. This architect advised that so much of the area as was needed should be cut off, and converted into a double of his famous Pump-room, leaving the rest to fall into greater ruin. Accordingly he walled up the arches, cut off the mouldings where they were in the way, and sheathed the entire wall-surface with battening. By this clever device he was enabled to mask all the objectionable Gothic of the edifice, and to obtain what a contemporary styled a very neat and elegant church. Such examples, Sir Gilbert claimed, are not to be let alone, as the antiquaries require, but, so far as practicable, restored to their original condition. He admitted, however, the difficulty of discriminating between what should be removed and what left, and defended his own practice, or rather intention, in such matters.

To us who are so far removed from the immediate interests involved in the difficult question of restoration, the controversy seems really to be between the clergy, who desire to have the old churches set forth for the convenient and beautiful service of religion, in accordance with the best architectural knowledge available, and the antiquaries, who seem to claim that these churches are primarily historical monuments, to be scrupulously conserved for the sake of the authentic records they present, without regard to convenience or beauty. But it is the architect, the natural agent of the clergy in this work, against whom the antiquaries make their bitterest complaints; and the more learned and artistic the architect, the more bitter the complaint. Old buildings which have remained in use through a succession of centuries naturally receive the architectural impress left upon them by the various alterations and additions made to them with more or less *naïveté* to suit the passing requirements or changing fashions of the day. If such buildings still remain in use, they must still suffer change. It is impossible to stay this process; and if we are more learned than our predecessors, and more familiar with precedents and their significance in history, it is reasonable to suppose that the modern changes will be less harmful than the ancient. Doubtless the modern architect, laboring conscientiously in the service of his time, has frequently been misled by his own knowledge, and has often substituted new for old work injudiciously. But who is to draw the line between what is good and what is bad? This is a matter of judgment, in which respect a recognized master must needs be entitled to greater consideration than any literary person or amateur whatsoever.

It is always instructive to listen to sober and well-considered criticism. Let us therefore see what an authority so moderate and self-contained as Mr. Ruskin has to say touching modern restoration.

VENICE, 15th April, 1877.

MY DEAR SIR, — It is impossible for any one to know the horror and contempt with which I regard modern restoration, but it is so great that it simply paralyzes me in despair, and in the sense of such difference in all thought and feeling between me and the people I live in the midst of, almost makes it useless for me to talk to them. Of course all restoration is accursed architect's jobbery, and will go on as long as they can get their filthy bread by such business. But things are worse here than in England; you have little there left to lose: here, every hour is ruining buildings of inestimable beauty and historical value — simply to keep stone-layers at work. I am obliged to hide my face from it all, and work at other things, or I should die of mere indignation and disgust.

THE PERSONAL RELATION OF ARCHITECT AND CLIENT.

THE service of an architect to his client includes three kinds of work which are inseparably connected, but are in their nature so different that but for the convenience of their intimate co-ordination they might be regularly performed by three different persons, as indeed they often are divided, in practice, among more than one. There is the selection of means for supplying his client's needs — that is, the planning of his buildings; there is the artistic treatment or designing of them; and there is the practical handling of the work — that is, the construction and administration of it. These three kinds of duties concern the client in very different ways, and would, if they were divided in the performance, probably lead to different relations between him and his agents. Thus the handling of the work usually concerns the client only indirectly, and with reference mainly to its influence on the cost, and as a means of giving effect to its planning and design. It is a matter in which, except as regards the general excellence, the finish and substantial quality of the work, and its cost, the client does not usually much interest himself; and which, in fact, he does not assume to understand minutely. He leaves the details of it to his architect, who, under certain easily-defined limitations, does not depend on the client for directions, but is guided by his own technical experience, and is as independent of any intimate consultation with the client as is the grocer who supplies him. The labor performed in this kind of service is absolute, bearing little relation to the individuality of the client; and of a kind which it is pretty easy to reckon, and, if required, explain so that it can be understood. If the architect's service were all or chiefly of this kind, his relation to his employer would be what it is very common to consider it to be, a substantially commercial one, quite impersonal; in which the labor and the compensation could perhaps be allowed for with the minute precision that belongs to business affairs. This kind of service, however, though it is inseparable from an architect's work, and is the portion of it which perhaps looks largest to the eyes of many people, and is apt to be taken as the measure of the rest, is in fact the least characteristic part of it, important as it is; has the least effect in determining his actual relation to his client,

and might perfectly well be performed if there were no architects in existence; though convenience dictates that while they exist, they shall perform it.

When it comes to the planning of his work, however, the case is very different. Here the architect has to deal not with materials and modes of construction, whose laws are impersonal and unchangeable, but with a series of clients whose needs are all different, who bring him at every turn some new problem to solve, some new want or taste or caprice to consult. What will suit one client will not suit another; the architect's success is in the way he adapts his work in each case to the individual. It makes a difference, it is true, what sort of work is done. With public buildings for instance, when there is no personal client, there are no personal relations, and should be no personal wants or fancies to be suited, though unluckily these do often interfere. But in whatever a client builds for his own use, his wants are paramount. The building of his own house may be taken as the commonest and the typical example. Here the architect's relation ceases to be primarily a business one, and becomes confidential. He must know his client's wants minutely in order to carry them out carefully, and this involves a knowledge of habits, tastes, and manner of living. The position is analogous to that of a confidential lawyer or a family physician. When a client has told his architect in what rooms he will live, and what furniture he will put into them; how many chambers he will have, and how his family will be distributed in them; how many servants he provides for; what conveniences he depends on in the way of kitchens, wash-rooms, bath-rooms, closets, sinks, and bowls; how much money he is going to spend, and where he will lay it out, and where save it; he has already, whether he expected it or not, admitted him to a somewhat confidential footing, more confidential probably than he will be disposed to offer to most of his neighbors. The architect's services become more or less those of personal friendship: their value depends on the unreserve with which the client lets him into minute knowledge of his wishes, and upon the sympathy and zeal with which he enters into them. Without a certain degree of sympathy it is impossible that the architect should do his best service. The refined and fastidious client requires refinement and fastidiousness in his professional adviser, or the best good-will will not make his needs comprehensible. Some degree of intimacy, for the time being at least, is the natural accompaniment of such a relation, the necessary condition of the most acceptable service.

This kind of relation is a matter of course to those who have experienced it, and sufficiently obvious to those who stop to reflect upon it. It is, however, no element of the purely business connection which is commonly assumed to exist; and though we shall find that a tacit, perhaps an uncomprehended, recognition of it is at the bottom of the scheme of payment for architectural services which is in use the world over, yet it has no place in the idea with which inexperienced persons enter into engagements with their architects; and the want of appreciation of it leads to many misunderstandings and disagreeable surprises. The client may take it for granted that his own wants are the wants of the world, and, expecting the architect to understand and provide for them by virtue of his experience, may be disappointed presently at finding that they are things peculiar to himself, which he should have taken pains to make known in good season. Many an annoying bill of extras, and consequent complaint of neglect on the part of an architect, is simply the result of the client's failure to explain fully in the beginning the things on which his mind was set. Many are the disappointments suddenly developed because the architect has not done what it was taken for granted that he would do, though he had not been warned; many the points perhaps at which of two or three ways that might be followed, he has taken, through ignorance of some peculiarity of the client's taste, just the one that pleased him least. There are clients, on the other hand, who err on the opposite side from just the same want of consideration. They come not only with all their wants considered, but with all the means of supplying them minutely prescribed. They have perhaps drawn a plan for themselves, and have not only fixed the size and general disposition of their rooms, but all their appointments, and even their forms of decoration. They want a bay-window, and it must be like such an one that they have seen. The porch on such another's house pleases them, and they want one like it. It is nothing to them that these things do not suit each other, or the house to which they would attach them. It is nothing that the architect of experience, if he once understood what the essentials of their desires were, could suggest for each a dozen means of satisfying it to the one which they have in mind, and probably some which they would prefer if they would look at them. Their minds are bent on their preconceived preferences; they cut themselves off from profiting by a knowledge and experience a hundredfold greater than their own; and the architect has to set himself to the mechanical labor of embodying their crudities or reconciling their incompatibilities in the best form he may; but without interest in his task, because without sympathy with it, and therefore with indifferent success.

It is very easy for the architect, on his part, working from his general experience and sense of the eternal fitness of things, to go on shaping out his work with insufficient knowledge of his client's wants, which he ought to study carefully; or without reference to his tastes, habits, and caprices even, with which, by a little contrivance, he could comply, to his great satisfaction, and to no injury of the work. These are familiar instances of the ill success that results from want of sufficient understanding between employer and architect. Everybody can cite cases where men have built themselves houses, and then found them not at all what they wished or expected; and any architect can say with feeling how often his clients may forestall his best work by inferior devices of their own suggestion. We question, in fact, whether there is any professional relation, except the pastoral and physician's, into which so much of personal familiarity enters, as into the architect's. It is then something distinctly different from an ordinary business relation. The services rendered in it are of a difficult and a more complex kind than those of business agents, and cannot, in the nature of things, be estimated with business precision. The amount and character of the labor they involve will naturally differ as much with the character of the client as with the nature of the problem presented; the personal element will tell on them quite as much as the technical. An uncomfortable and exacting client may double the labor of designing and carrying on a building, and a considerate one may materially lighten it. The degree of confidence that exists between the two will greatly influence both the amount of it and the success of it. There being so much of the element of personal knowledge concerned, it is natural that the architect who has once built for a man is, *ceteris paribus*, the best person to build for him again; and a permanent clientship, like that of a family physician or a confidential lawyer, is of natural growth when a client continues building. The client who by exactions and careless interference wears out his architect's zeal — and no human zeal is indestructible — may know that he cannot possibly get the best work out of his architect, be the latter never so conscientious. The lawyer and the physician may possibly do their work as well in spite of such influences, for the intellect can work in spite of them; but the imagination and the feeling are less independent of circumstances, and cannot be made to do their best at a disadvantage. Here is a warning.

The architect's function in the other kind of work which we distinguished above, that is, in artistic design, is a different one from those we have examined, and gives rise to some interesting questions in his relation to his client, perhaps suggests some limitations of it, but does not in any way alter the character of it, nor add any considerations which affect its confidential quality. It may therefore be left one side in this article. We have dwelt upon this confidential character of his professional relations the more because it is, as we shall see in another article, the essential factor in determining the nature of his compensation, a matter which, from a want of general understanding of its bearing, is in the unfamiliar state of American practice the subject of many misunderstandings and not a few disputes. It may be added that while this complicates the labors of his position, and in a considerable degree increases its difficulties by increasing its delicacy, it brings a compensation of its own in the sense of friendly personal relations and of acceptable personal service rendered. There is a real satisfaction in providing for the wants of a friendly client, to which most architects can testify, and which, apart from a purely professional interest

in the work, is often the chief recompense to be got from a kind of work which, if in this respect the most agreeable, is usually the most unremunerative of all an architect's labors.

The closeness of this confidential relation varies, as we said, with the kind of work which the architect performs. It is greatest when he builds his client's dwelling, and less and less in other work according as this more or less nearly concerns the actual personal convenience of the client. In public buildings, or buildings that are erected for corporations, and many others, of course the personal element disappears, but the confidential one remains. The architect's service is not merely one which it is not convenient for the client to perform for himself, but one for which he is not competent. It is a thing in which the client must depute an important responsibility to his adviser, and must confide in that adviser's professional judgment for the administration of a duty which he does not himself understand. This is the characteristic which distinguishes a professional from a commercial service. These considerations are the reasons why an architect's service should be, and actually is, in usage classed with those we have instanced, a physician's or a lawyer's, rather than with a broker's or a commission merchant's.

SANITARY ENGINEERING.[1]

II.

MR. DENTON'S division on Water is full of valuable information, being a *résumé* of its sanitary bearings. He places the amount of water actually needed for all manner of domestic use, including the washing of floors, of carriages, etc., at *fifteen gallons* per head per day; and he considers all beyond this, taken for private service, as mere waste. He allows an additional consumption of ten gallons per head for ordinary industries. Leaving out such industries as require an unusual supply, his allowance for the generality of towns is twenty-five gallons per head, and for rural villages fifteen gallons per head. He disregards the opinion of the Water Supply Commissioners of England, that rain water, stored in underground tanks, is objectionable as a source of public supply; and he gives satisfactory reasons for his opinion. Certainly our experience in this country is entirely favorable to his view. The abundance of this source of water to be drawn from roofs and from paved and other impervious surfaces is indicated by the following quotation: —

"It savors of the ridiculous to speak of a water-famine when the total quantity of liquid (of every description) drunk by each person does not, in fact, exceed in amount the quantity of water that would fall as rain in twelve months upon a good-sized umbrella, if exposed for the purpose in either of the counties of Devon or Cornwall."

The use of rain-water which has fallen upon the roof, and which filters through the ground to supply springs, or which flows over the surface to supply brooks and rivers, constitutes a very important source of supply, but one which is more or less suspicious in its character according to the soil through which it has filtered or over which it has run. The conclusion of the River Pollution Commissioners on this subject is thus given: —

"Rain water collected from the roofs of houses, and stored in underground tanks, they state to be much more impure; while the water collected from the surface of cultivated lands, and from the under-drains of cultivated lands, is always more or less polluted with the organic matter of manure, even after subsidence in lakes or reservoirs. Such polluted surface or drainage water is, they declare, not of good quality for domestic purposes; but it may be used with less risk to health than polluted shallow well water, *if human excrementitious matters do not form part of the manure applied to the land.*"

The last clause of this quotation is full of suggestiveness for towns which derive their water supply from streams and ponds fed in whole or in part by the surface flow of cultivated lands. Even polluted waters, when filtered through a well-*aërated* soil, or the water of deep wells, and the outflow of deep under-drains, are stated to have their impurities removed and destroyed by oxidation, and to be of good potable character. The use of deep wells, however, especially as a source of public supply, entails too much cost for pumping to be desirable when any other good source is available. It would often be cheaper to make underground tanks or cisterns for the storage of rain water flowing from well-protected lands than to encounter the expense of pumping.

Mr. Denton holds to the opinion "that, in fact, there exists no more certain source of a pure and sufficient supply than that of properly collected and properly filtered rain-water, which is with care to be secured by all persons alike."

Concerning the use of wells, it is to be remembered that connection between these and the sites of the percolating cesspools very often leads to the transmission of foul matters through deep-lying porous strata, below the reach of atmospheric influences, and where impurities are freely transmitted.

"That the effect of sinking deep wells in the new red sandstone is to lower very sensibly the water level, is supported by the fact that when the corporation of Liverpool sunk the Dudley-Lane well, such was the influence it had upon other wells in the vicinity that several became dry, and the owners converted them into cess-pits for their liquid sewage, which in its turn found its way into the Dudley-Lane well."

Concerning filters, reference is again made to the oxidizing action of porus and well-aërated material.

In subsequent articles we shall take up the very practical suggestions contained in Mr. Denton's work, concerning the processes of Sanitary Engineering.

[1] Sanitary Engineering: a series of lectures delivered before the School of Military Engineering, at Chatham, Eng., by J. Bailey Denton, F. G. S. M. Inst. C. E., etc. E. and F. N. Spon, London and New York.

THE ILLUSTRATIONS.

HOUSE FOR HON. E. C. SPRAGUE, BUFFALO, N.Y. MESSRS. OAKEY AND BLOOR, ARCHITECTS.

(German Insurance Building, Buffalo, N.Y.)

THE materials employed for this house are white limestone for sills, etc., and red brick with red joints. The bays are of hard wood, oiled; the side-panels sheathed with shingles, oiled. The cornice is of galvanized iron, decorated in color by stencilling on the panels formed by the ribs. The roof is of red tile. The porch of hard wood, turned and oiled.

UNITED STATES CUSTOM HOUSE, COURT HOUSE, AND POST OFFICE, ALBANY, N. Y. MR. J. G. HILL, SUPERVISING ARCHITECT, TREASURY DEPARTMENT.

(Washington, D.C.)

FRAME COTTAGE. MR. C. M. MORGAN, ARCHITECT.

(1298 Broadway, New York, N.Y.)

DETAILS FROM STORES IN BOSTON. MESSRS. EMERSON AND FEHMER, ARCHITECTS.

This is another of the drawings prepared for the Portfolio Club.

STUDY OF INTERIOR DECORATION. — PLATE X.

This drawing referred to in Article XII. of the series of papers with the above title, which appeared in our number of June 30, has been accidently delayed until now. The notes of color in the margin of the drawing may serve to recall the points in that article which it undertakes to illustrate.

The word *passion* in the 5th line of that article should have been printed *fashion;* the word *sufficiently* in the 19th line on page 205 should have been *efficiently;* and the word *border*, 8 lines farther on, should have been *bolder*.

CORRESPONDENCE.

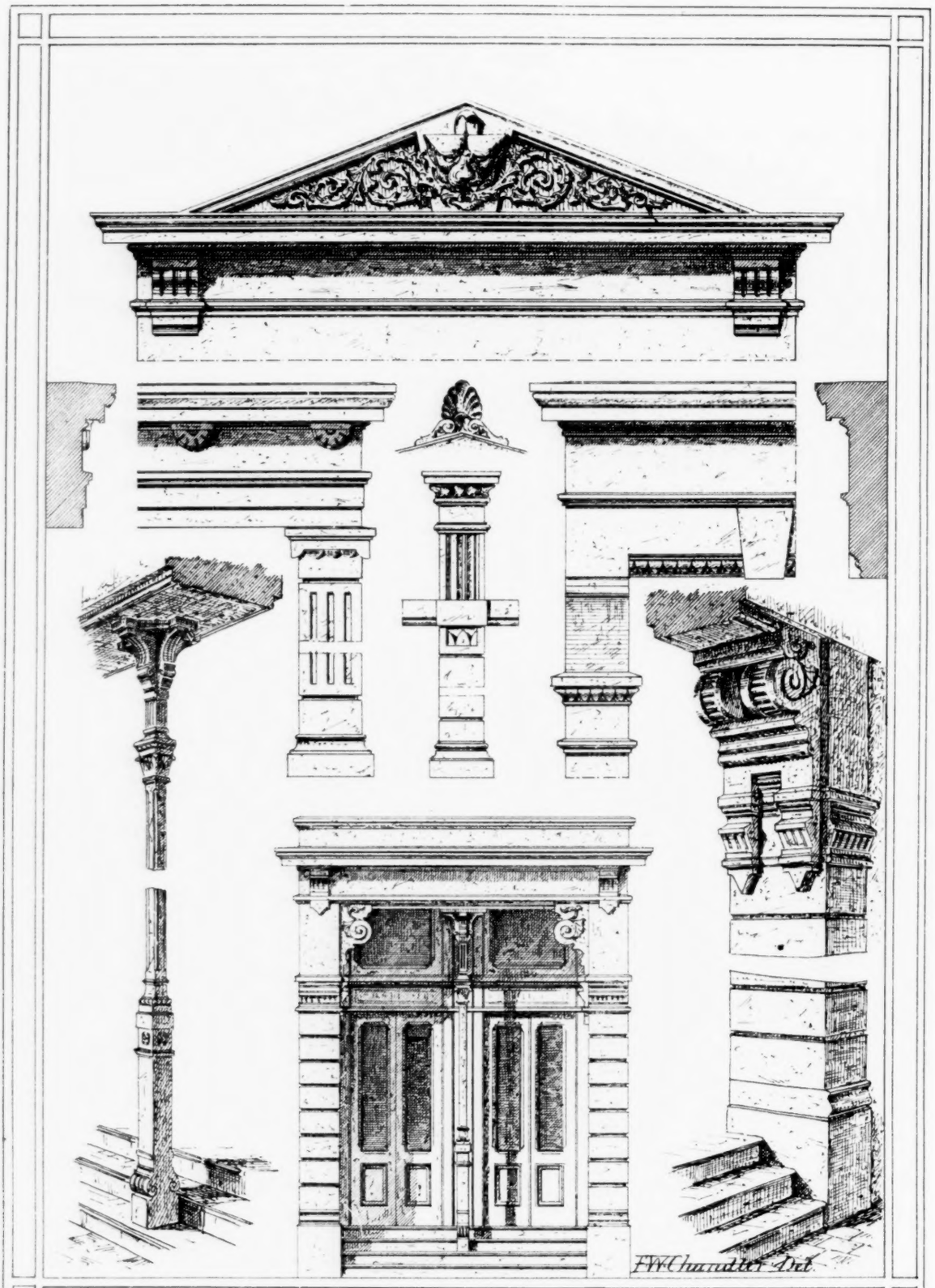
ARCHITECTURE AT THE ROYAL ACADEMY. — II.

LONDON, June 21, 1877.

RESUMING our notes with the results of another competition, that for the Shakespeare Memorial Theatre at Stratford-on-Avon, we find the successful design is that by Messrs. Dodgshan and Unsworth, a very picturesque work in the old English style shown in a very fair drawing. The theatre proper is perhaps the best part of the composition: in form it seems to remind one of the great dramatist's own theatre, "The Globe," and in style is not only altogether suited to Stratford and its associations, but is a very clever piece of treatment. The circular form of the plan is preserved in the exterior, and is covered with a conical roof; the materials are evidently brick with tile roofs, and round the upper part of the walls is an overhanging passage or gallery of half-timbered work. The picture-gallery is not quite so successful, especially the glass roof with which it is covered; but the connecting porch and passage between the two is again a good piece of design, cleverly worked out. Altogether a good deal of originality is displayed, and, what is more to the purpose, this is attained without the sacrifice of good architecture. The other design shown is by Mr. H. R. Florence: it is Italian in character, and, though very well drawn, is not so good as the last mentioned. It is more pretentious and more monumental, but does not seem nearly so appropriate to the work in hand: it is probably more academic, but not nearly so artistic; and, above all, it is not so English. Considering it is Shakespeare and his native town that are being dealt with, this is a point of more importance than usual. Your readers will be glad to hear that the successful design is being built, and that there is some prospect of the whole scheme being thoroughly carried out.

Mr. Robson, the architect to the London School Board, gives us a suburban villa at Wandsworth: it is very good, but not nearly so clever as some of his school designs, which it resembles in most of its leading features; indeed, it might pass for a head master's house, say for one of the largest. Then we have two of the now noteworthy schools themselves: one, Hanover School, Islington, is very

Sketch for a
FRAME COTTAGE
C.M. MORGAN, Architect.
First Floor Plan
Parlor 15×15
Kitchen 10½×15
Dining Room 14×14½
Hall
Veranda
Veranda
Veranda
Porch
Pantry
Bay w.
Bay w.
Closet
Sink
Range
Book Case
Dining Rm
Drawing Rm
Hall
Library
Gallery
Area
Grass Walk
DELAWARE STREET
House at Buffalo, N.Y.
for the Hon. E. Sprague.
Messrs. Davis and Brodie, Architects.
HELIOTYPE
JAMES R. OSGOOD & CO. BOSTON



EMERSON AND FEHMER ARCHTS.
DETAILS OF STORES ON KINGSTON ST AND ON CHAUNCY AND SUMMER STS.

HELIOTYPE JAMES R. OSGOOD & CO. BOSTON

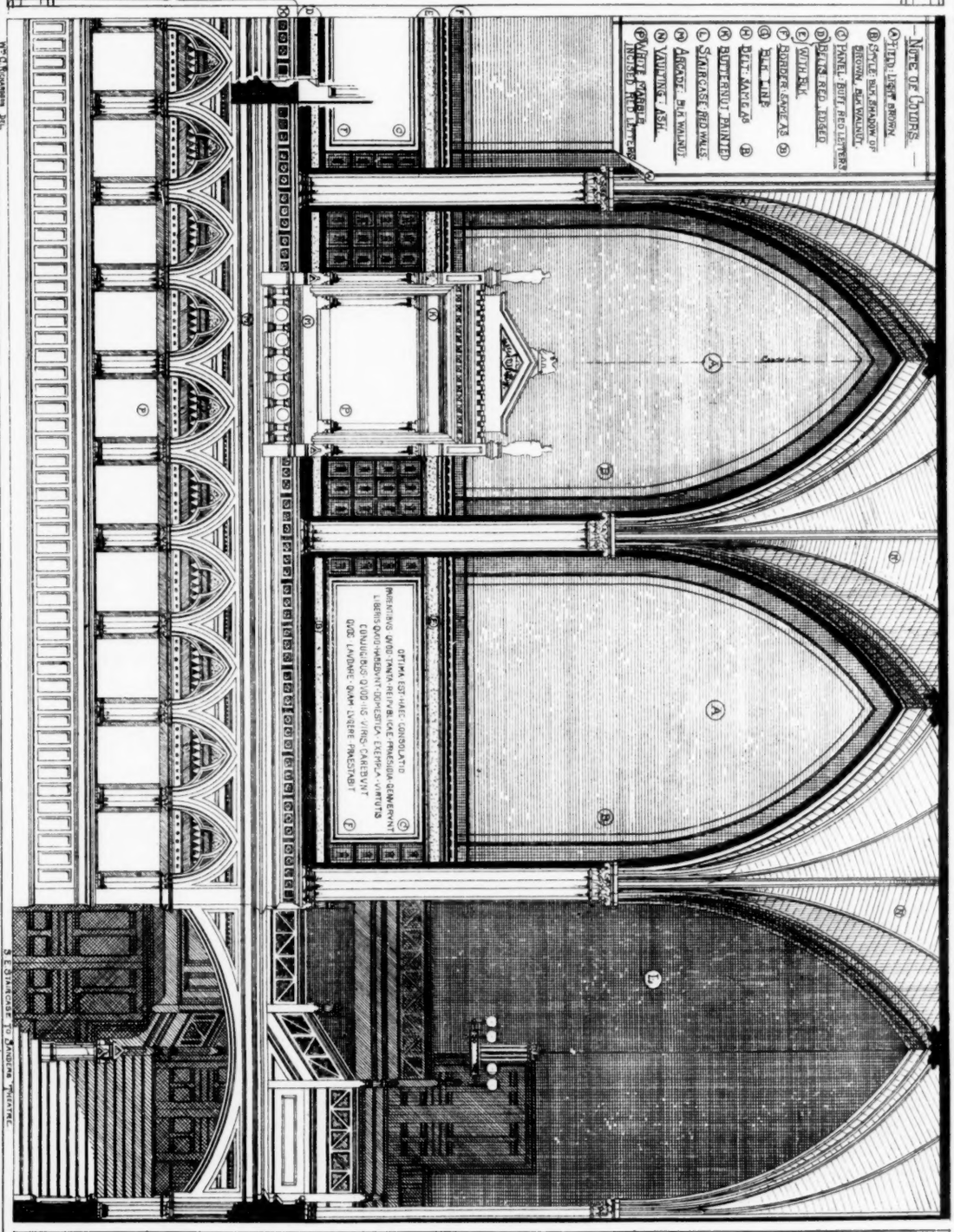
U.S. CUSTOM HOUSE, COURT HOUSE AND POST OFFICE, ALBANY, N.Y.
JAS. G. HILL, SUPERVISING ARCHITECT TREASURY DEPARTMENT

STUDIES OF INTERIOR DECORATION. PLATE X:

VESTIBULE OF MEMORIAL HALL OF HARVARD UNIVERSITY: CAMBRIDGE, MASS:

WARE & VAN BRUNT: ARCHTS:

LONGITUDINAL SECTION THROUGH THE MEMORIAL VESTIBULE LOOKING EASTWARD SHOWING THE TABLETS ON ONE SIDE OF THE HALL AND THE STAIRCASES TO SANDERS THEATRE:


NOTE OF COLORS.
A RED, LIGHT BROWN
B STYLE, BLK. SHADOW OF BROWN. BLK. WALNUT.
C PANEL, BUFF. RED LETTERS
D BASE, RED. TILED
E WITH BLK.
F BORDER, ANGLES
G BLK. MBLE
H BUFF, SADDLES
K BUFF, PAINTED
L STAIRCASE, RED TILES
M ARCADE, BLK. WALNUT
N VAULTING, ASH.
P WHITE MARBLE INSCRIBED RED LETTERS
OPTIMA EST HAEC CONSOLATIO
PARENTIBVS QVOD TANTA REIPVBLICAE PRAESIDIA GENERVNT
LIBERIS QVOD HAEREDVM DOMESTICA EXEMPLA VIRTUTIS
CONIVGIBVS QVOD IIS VIRIS CARERE VNVM
QVOD LAVDARE QVAM LVGERE PRAESTABIT
SECTION ON LINE TO SANDERS THEATRE

HELIOTYPE
WM. H. RICHARDSON DEL.
JAMES R. OSGOOD & CO. BOSTON

picturesque and very well designed, helped probably a good deal by the site, which is by the side of a canal, a feature taken every advantage of in the very well executed drawing. The style is the usual version of Queen Anne with which we are now familiar in the buildings of the London School Board. In conjunction with Messrs. Flockton and Abbott, Mr. Robson also sends a design for Frith College School Board Offices and Central Schools, Sheffield, a large group of buildings not very well thrown together; a conglomeration of Queen Anne features, with no very distinct meaning about them.

Mr. J. L. Pearson, A.R.A., sends two contributions: the Parish Church at Horsforth, Leeds, and St. Michael and All Angels, Croyden. The former has a good east end, but the rest of it is only middling. The latter is a very fine church indeed; early English in style, and in Mr. Pearson's best manner, full of good proportion and beautiful detail, worked out with that delicacy and grace for which he is famous. Thus both the architectural associations come out strong in church work this year.

In No. 1,141, we have the first instalment of the new buildings destined to make or mar London's latest metropolitan improvement, Northumberland Avenue; a block of offices and warehouses, to be built by the Society for Promoting Christian Knowledge, and designed by Mr. J. Gibson. This building is to stand at the north-east corner of the new street, facing Charing Cross, and on part of the site now occupied by old Northumberland House, one of the most splendid sites in all London. For this Mr. Gibson gives us a somewhat plain front of the ordinary classic type, neither very good nor very bad; nothing very striking, and on the other hand nothing to offend. For the latter we ought to be very thankful, as so much cannot be said of many other fine sites; but, considering all the consultations between the Board of Works and the Royal Institute of British Architects as to the best method of securing the finest architecture for the grand new street, this instalment is rather disappointing. Probably if less had been said on the subject, less would have been expected; but as it is, this is the sort of architecture of which any number of examples can be found in the city, equally good and equally commonplace. When this has been said, there seems nothing more to add, except that if this is to be taken as the key-note of what we are to expect, we are afraid that architecturally, at all events, the avenue will hardly be the finest thoroughfare in Europe, such as we are given to understand it was the intention to make it.

No. 1,149 is another piece of classic architecture similar to the last, being Mr. J. C. Clarke's new Bank of Scotland, now building in Bishopsgate Street. The ground-floor story is very poor; but the upper part is very good, and the whole is the ordinary respectable classic of the regulation type just referred to; this time it is in a city street on an ordinary site, and looks as usual; carefully detailed and carefully carried out, but only commonplace after all; safe and good, but commonplace for all that. 1,159, a big classic hotel by Mr. Ellis, for Waterloo Bridge, with only its size to recommend it. 1,152, more classic, but this time of a more ambitious type, is the interior for a proposed design for rebuilding the oratory at Brompton by Mr. F. W. Moody. This church reminds one of some of the large French classic churches; an arcaded nave with side aisles, dome, and apsidal chancel, and has a certain breadth of treatment and largeness of handling, which would be extremely effective should it ever be carried out, which, however, is very problematical: it is somewhat like the Roman Catholic Cathedral of Westminster in this respect — it exists only on paper, and is likely to remain there for many years to come. No. 1,162, an example of interior decoration by Mr. H. W. Battey, is notable as a good study of color, very harmonious and quiet. 1,165, the Children's Hospital at Cardiff, by Mr. J. D. Sedding, is a homely piece of Queen Anne, rather more Gothic in feeling than usual, but very artistic in design, and carefully worked out. 1,167 and 1,172 are a couple of very good churches: the former by Mr. J. O. Scott for Slough parish, and the latter by Messrs. Dawkes and Clarke for Beckenham; both in the English type of Gothic. The second is particularly fine, telling throughout with good detail and proportion. 1,173, Holloway College, Surrey, by Mr. W. H. Crossland, is a large building in French classic of the Château de Blois type; it is fairly well carried out, looks what it is, and seems very fit for its purpose.

Mr. J. E. Collcutt gives us a view of the red brick house he has built in Bloomsbury Square ; an artistically designed front, semi Queen Anne in style. The work looks better in execution than it does in the drawing, even though it stands out very abruptly from the surrounding commonplace houses among which it is built. The gable is made rather too much of, and is too pointed for good proportion; but it shows how picturesque our streets and squares might be if we had only a few more of such houses in them. The above about exhausts the list of notable works: though several more follow, there is nothing remarkable about them. The houses on the new Cadagon estate, for instance, may look all right when built, but they do not promise much from the drawings sent to represent them here, such as those by Mr. Robinson, by Mr. William Young, or even those by Mr. Stevenson, — all more or less Queen Anne in character, and bad character too in many respects. There does not seem to be much gain in getting variety and quantity of features huddled together at the expense of beauty of form and detail; and this is what a good deal of so-called Queen Anne is drifting into. The truth is, it requires the designer to have much more artistic power in him than is displayed by many of the architects who now work in Queen Anne, to treat it properly; the consequence is that many recent examples are coarse and vulgar in detail, and ugly in form, whereas the very essence of the style, in the hands of those who know how to treat it, is its refinement and grace of form and feature.

There are a number of admirable drawings of old work at Burlington House : such as is shown in No. 1,068, parts of the cathedrals of Sens and Canterbury, drawn by Mr. Weatherby for illustration to Sir G. G. Scott's lectures at the Academy; by 1,077, the vestibule of St. Mary's Abbey, York, by the same artist, and for the same purpose; No. 1,088, the Middle House, Mayfield, Sussex, by Mr. Maurice B. Adams, an excellent rendering of an old English house; the Parish Churches, Hayling Island, Hants, also by Mr. Adams; and again another drawing by Mr. Weatherby for Sir G. G. Scott's lectures, a part of the choir of Ripon; and the north side of Chartres Cathedral, by Mr. A. Webb. Then there are two or three little bits from Italy, — a pulpit from San Fermo Maggiore, Verona, by Mr. A. H. Haig ; and the tower of the Duomo, Pistoja, by Mr. P. J. Marvin; besides a clever water-color drawing by Mr. Romaine-Walker, of a view in Henry VII.'s Chapel, Westminster: all of which go to prove that good draughtsmanship has not yet died out among us.

Thus on a review of the whole, we may fairly admit that the display is up to the average both in point of design and drawing; and though many good names are still absent, such as Nesfield, Davey, Philip Webb, Bently, Godwin, Johnstone of Newcastle, etc., in this respect we have much more variety than last year. The mention of the last name reminds me that few provincial architects of note send drawings to the Academy : perhaps there is not much encouragement for them to do so, though as this is the only display of the year in the metropolis, it might command more attention in this way than it seems to do at present. If it is to be an architectural exhibition, it ought to be made as good as possible, and it can only be so by the best men among us sending drawings of their works ; and yet how many fine buildings are done throughout the year that never find any illustration at all either on the walls of the Academy or in the professional papers! As an instance of this we could name the mansion house of Kimnel in North Wales, by Mr. Nesfield; probably the finest as well as the largest example of the Queen Anne style yet built since the revival, and no one who knows Mr. Nesfield will need to be told how thoroughly and how artistically it is all designed and carried out ; yet so far as we know, no illustrations of any kind have ever been given of it.

The Academy is the only institution which can grant any honors, such as they are, of no great value to an architect, perhaps; but so long as it claims to be the Royal Academy of Arts, to be an exhibition of painting, sculpture, and architecture, and to teach all the three, the architects have it in their power to make those honors more highly prized, and its exhibitions more valuable, by giving it the best support they can with the most important of their works, and the benefit of their experience.

THE NEW BUILDINGS FOR TRINITY COLLEGE.

HARTFORD, CONN., June 30, 1877.

To the occasional visitor to the site of the new Trinity College in this city, the building about which so much has been said and written still appears to be as great a conundrum as ever. The public generally seems to be at a loss how to reconcile itself to the absence of quadrangles which were so charmingly pictured forth in the photograph taken from the architect's perspective drawing of the entire work.

As yet the quadrangle principle is undeveloped, and there is nothing to suggest it in the present line of structures, except the toothings of stone at the extreme end of one block, which calmly await the addition of the first cross line of blocks, thus hinting at the great and important idea of the entire plan. Of the work which has already been done, and of that which is now approaching completion, much can truthfully be said in favor.

With the exception of the gateway building, the line of structures forming the western side of the large quadrangle will shortly be finished. It consists of a dormitory and a lecture-room block, each 286 feet long by 35 feet in width, having central portions with front and rear projections, and carried up one story higher than the adjoining wings. A portion of the gateway is now being erected; and it is hoped, for architectural reasons if for nothing else, that it will not share the fate of some other city structures, and be left in an unfinished condition.

For good sound workmanship and solidity of construction, the buildings have no equal in this vicinity; and the success with which the work has been carried out is owing, in a large degree, to the personal attention of the superintending architect, Mr. F. H. Kimball. As a matter of course in this land of free thought and free opinions, verdicts as to the external appearance of the college differ; but the readers of the *American Architect and Building News* who are familiar, through the columns of London publications, with the works of Mr. W. Burges, have but to learn that the

design of the new Trinity College is from his hands, to be able to judge of its beauty and worth. Unlike many of the more recent collegiate structures, as at Harvard or at Princeton for example, the Trinity buildings are low; there is a basement, some nine or ten feet in the clear, with ground, first, and second stories; the rooms in the latter being lighted by dormer windows; and the whole height of the wings of the block, from the water-table to the top of the cornice, being but 24 feet. In the dormitory-block, a suite of rooms for the accommodation of two students occupies the entire width of the block, the "study" having an outlook upon the quadrangle (of the future), and the bedrooms, which face to the west, affording from their windows a rarely beautiful view of country. The advantage of this arrangement of rooms over that of having a longitudinal hall is obvious for many reasons. The bed-rooms, in the present instance, fully justify the use of "snug" as a descriptive adjective, and offer to the reckless lodger temptation to break down the "middle wall of partition," which, however, must be withstood, as the wall is of brick well bonded with hoop-iron. The "study" is a more comfortable apartment. It is about 15 feet wide by 16½ feet long and 10 feet high. In regard to it, the critic, standing upon the campus, invariably observes that "the windows are too small." From the outside, it must be confessed, the windows are deceptive as regards their resources; but from the interior they appear in a new light, and when the walls of the rooms are finished, no difficulty will be experienced even on cloudy days. The windows which light the "study" are three in number, grouped together, having jambs, transoms, mullions, etc., of Ohio stone. The openings are one foot eight inches wide by about two feet eight inches high, the transom lights being square.

Many buildings rely for their effectiveness upon two things: the pleasing outline afforded, and the successful carrying out of details. In the case of the new college buildings, these two points are prominently illustrated. The otherwise continuous outline of the long blocks is happily diversified by the extension of the central portions referred to, while the thoroughly excellent treatment of the two gables in this part of the design adds greatly to the general effect. The ultimate completion of the gateway will make still another and more important break in the sky-line, as the building will be carried up nearly a hundred feet from the ground-level; and although the height may at first seem disproportionate to the adjoining blocks, still judgment on this point must be made with reference to future work and completed effect.

All the details of the buildings derive much of their power from the boldness of their execution. This is particularly noticed in the label mouldings, the string-courses, the copings, the treatment of window-heads, etc. Wherever a diaper is used, as, for example, in the gables of the central portion, the patterns are simple, all intricacy of design being avoided. Among the prominent features of the blocks are the chimneys, which are universally admired. They are built up of rock-face Portland stone, the same material that is used for the ashlar work, with weatherings of Ohio stone, and finely cut caps of the same. They are of good proportions, and besides their beauty of design, they are of practical value for ventilation; and the number of flues which they contain both for ventilation and for the escape of smoke is almost incredible.

Something of an experiment is to be introduced in the casement windows of the dormitory block. These are made of cast iron, and will swing outward, being constructed with spring-bolts, so that they can be partially opened if desired, and a greater or less amount of air admitted. The swinging casements are to be set in the windows proper, while the transom lights will be stationary. The sash will be glazed with a border of two-inch lights, the central one having a cross-bar or not, according to size and location. In the case of triple windows, which are extensively used, the side casements of the transom lights will be uniform in design, while the middle one will present a different pattern. This style of iron-work is extensively used abroad, whence the college imported a single casement; but its adoption in this country is not as yet common.

While speaking of imported work, mention might here be made of the ridge tile used upon the buildings. It is conspicuous from a distance, and has the appearance of a band of red ribbon. As a finish to roofs, it is immeasurably superior to the ordinary iron cresting whose patterns are in nine cases out of ten indistinct except upon close inspection. At the present time it is not necessary of course to send abroad for ridge and roof tile, as we have home manufacture of terra-cotta work; and to say the least it is not an economical investment unless they are packed with great care, as the breakage is astonishing to contemplate, if one may judge from the number of broken tile seen about the college buildings. The tiles crown not only the principal ridges, but those of the dormers. In the dormitory block the larger dormers are constructed with triple windows built of Ohio stone, the sides being slated in conformity with the roofs. They are to be surmounted with finials carved after imported models. In addition to the stone dormers there are single ones of wood which light the hall-ways. They are very diminutive by comparison, but are pleasing to the eye both in design and color, the latter being a rich Indian red tint. The finials for these windows are extremely picturesque. They are made of lead with four "horns" supported on an iron rod, which fastened to the ridge of the dormer below, runs up and terminates in a steel point forming a pivot for the revolution of the copper flag above. The flag is gilded, and its face is perforated with a grotesque pattern; to preserve its equilibrium, a prong runs out on the opposite side having at its farther extremity a ball loaded with shot.

One of the most characteristic points of detail in the interior of the buildings is the regard paid to mantels and chimney pieces. In every instance they are of stone, the Ohio stone being used. According to location they vary in design; those in the students' rooms are plain, the opening having a segmental arch with a chamfer, which carried down upon the inner edges of the jambs, is finished with a stop; the outer edges of the jamb-stone are laid irregularly, and the shelf has simply a bevelled edge. In the rooms assigned to junior professors, and located in the central portions of the blocks, the mantels have the front decorated with sunk panels of quatrefoil pattern. It may be considered somewhat of a departure in college architecture to set up in the lecture and recitation rooms such beautiful specimens of stone-work as are to be seen in these new buildings. The chimney-pieces with the great stone hoods and bold projections form an imposing feature of the apartments. In some instances the chimney-pieces are twelve feet high and six feet wide, thus extending from the floor nearly to the ceiling, as the rooms are over sixteen feet in height. At a future time carvings and foliated work will probably enrich these mantels; but even at the present time they are not only beautiful in design, but executed with a fidelity to detail most praiseworthy. Ohio stone is used for interior work in many other instances, notably in the jambs of doors opening from the various hall-ways, where the effect is particularly good. In the lecture-room block are seen many finely cut stone corbels for the support of iron beams, which in their design carry out the same general principle of simplicity and boldness of detail. The windows of the recitation-rooms being at a considerable height from the floor, will not have the iron casements before described, but will be fitted with lead sashes similar to those used in churches, and arranged to open by means of cords. As is generally known, the plan of the college provides separate buildings for a chapel, library, dining-hall, museum, etc., which are to be located in the cross lines and completing lines of the quadrangle. Of these it has been decided to build three instead of four as originally laid out, the central one being the largest, and having one to the north and one to the south.

In the absence of many of these separate structures, temporary arrangements have been made in the building known as the lecture-room block, so that it will soon be possible for a student to attend morning prayers, go to recitation, eat his dinner, draw books from the library, revel in the mysteries of geological formations, and in a few cases retire to his room for the night, scarcely going out of doors for the purpose. This is a wonderful example of what is so much cried up at the present time, namely, "condensation." As before mentioned, the gateway is to be partially built. It will probably be carried up one story, this being a case of necessity, as the kitchen, laundry, etc., are to be located in the basement. Immediately west of it, and sunk to a level with the ground, is the boiler-room. The steam heating is to be done both by high pressure and low pressure, the contract being carried out by the Walker and Pratt Manufacturing Company of Boston. During the past year the contractors for the light stone-work, Messrs. Ellin and Co. of New York, have had a diamond saw running at their temporary works upon the college site. As a labor-saving machine its powers have been fully tested; and though put up at considerable cost, like many other things it pays in the long run. Among the objects which attract the attention of visitors at the grounds is a model in the architect's office. It represents the two blocks about to be completed, together with the intervening gateway when finished; it is built to an eighth of an inch scale. Pine blocks of the proper dimensions have fastened to them all projecting work in the shape of chimneys, dormers, etc., and upon the entire face is glued a carefully prepared elevation drawing, the light stone-work being tinted, as are the main roofs and those of the dormers, these, however, being colored directly upon the wood. The effect produced is picturesque, and from it the appearance of the whole line of completed buildings can be directly learned.

At the recent commencement, in view of the early occupation of the new site, considerable enthusiasm was expressed by graduates and others particularly interested in the secret society organizations, with reference to the erection of buildings for the occupancy of the various associations. In the course of a few years, doubtless the "Halls" will be as conspicuous about Trinity College as they are at Yale, though the miscellaneous use of different building materials adopted in New Haven by the college fraternities is not to be as much regretted there as it would in the present instance were the same idea repeated, as there is to be a harmony in the architectural expression of all the new Trinity College buildings proper, and this should extend to the secret society halls which may be built upon or near the new site. CHETWOOD.

DISCOVERER OF CALIFORNIA GOLD. — A monument is to be erected at Coloma, Cal., in honor of Marshall, the discoverer of gold.

CENTRAL PARK.

NEW YORK.

TO THE EDITOR OF THE AMERICAN ARCHITECT.

Sir, — Under the heading of "The Central Park" there appears in a recent issue (June 2, p. 175) some further remark from one of the landscape architects of the Park, on the brief paragraph devoted to that fine work of art in the opening address I prepared for the last convention of the Institute of Architects. Allow me to meet such of your correspondent's observations as can fairly be adjudged within the range of that paragraph.

Fortunately, the "credit" of any "profession" can, as a whole, be neither marred nor mended by the utterance or action of any single member. Moreover, in this case, the Institute, according to a regulation of its Committee on Publications, is not responsible for the individual utterances of its members through its publications.

I am glad your correspondent appreciates the praise I thought I could fairly bestow on his work in my "architectural minute as to the design of the Central Park;" but he somewhat overstates it. If in the phrase "general design" he includes the structures on the Park, I do not credit him with any part of it; and as to the foundational portion of the landscape design, I say expressly that it "had been outlined and the first rough steps of the work initiated" by another person. Not that your correspondent may not have inspired his original associate with ideas for the architectural design, just as he assures us of the *vice versa* aspect of the case. The work performed on the Central Park — in its earlier stages, at least — was essentially one of co-operation, as I took occasion to specify in a former paper of mine, on "Architectural and other Art Societies" (p. 60, or 124 of the series) published by the Institute in 1869.

I did take great pains that the record employed for my address should be authentic; but to fill out to completeness the skeleton representing the building art-work of a century in the life of a nation would far outstrip the limitations of an occasional discourse.

Is it not, then, somewhat *mal àpropos* to speak of "circumstances" as "wholly lost sight of, and forgotten," the introduction of which into the record would be a mere intrusion on limited ground already crowded?

I know there are quite a number of erroneous popular impressions about architects; and it is manifestly proper in your correspondent to do his share in dissipating them, since he has found the co-operation of architects a great furtherance to his plans. But I fancy some of them will learn for the first time, and with surprise, of the existence of any *popular* impression which divorces their "special training" from successfully coping with "works of landscape design." A. J. BLOOR.

HOW TO LAY A DRAIN.[1]

BEFORE treating of the general principles to be followed in house drainage, I may remark that in the selection of the materials of our drains there is now much choice. The use of glazed fire-clay or earthenware pipes is almost universal. Cement pipes have been recommended by an eminent authority, but as I have had no experience of them it is not necessary for me to do more than mention them. No one would now propose to use brick or stone culverts or drains, square in section, with sides of brick and bottom of slate, as were formerly in vogue. Practically, then, our choice of materials is limited; but, as usual, there are great variations in the quality of the article supplied not only by different but by the same manufacturers. What the architect should insist upon is a strong, well-burned material, accuracy in form both sectionally and longitudinally, true sockets, and a good, smooth glaze. The smaller pipes are especially liable to be twisted longitudinally, and such should be at once rejected. Pipes having a rough interior should not be used, as lumps and blisters in the glaze accumulate material round them, and injure the efficiency of the drain.

At the risk of being accused of putting the cart before the horse, I will also explain the practical art of laying drain-pipes, and the fall it is necessary to give them, before touching upon the general question of how to design house drainage. I do this because I consider the proper laying of the pipes one of the most important parts of drainage, and the one in which failures must often occur, and without which any system of house drainage will not perform its functions satisfactorily. The true laying of a pipe is of more importance than its quality. An inferior, rough, and crooked pipe may, if laid properly, under ordinary circumstances be made to perform its work satisfactorily; whereas the best-made pipes in the world will only act for a time, and then inefficiently, if laid in those beautiful vertical and horizontal sweeps and undulations known as "Hogarth's line of beauty," so frequently met with when a drain is bared to be taken up, and only then seen in its full perfection.

The righteous indignation of the bricklayer and his laborers employed in taking the drain up, against the tradesmen who laid it down, is only fully appreciated when, on having to take it up a second time, we find these honest men have put in a pipe without a socket, or a square junction, or a junction turned the wrong way, or accidentally omitted to make a joint good, or done or left undone some one of those multitudinous things essential to good workmanship. Truly the architect's bed is one more of thorns than roses.

The next thing to be determined on is the fall, and I cannot too strongly insist upon the necessity in all cases of having the levels first accurately taken, and a section made, before the drains are put in. This is an additional trouble, no doubt, but will be amply repaid in the quality of the work. Of course when the whole of the trenches can be opened at once, this is not always necessary; but it more often happens that the trench has to be filled up as the work proceeds, either from the nature of the ground or the exigencies of the site. The architect should of course aim at getting the greatest amount of fall from the sewer to the junction with the branch drains of the house, keeping in view that these should themselves have quicker gradients than the main drain. A fall of 1 in 48, or half an inch to a pipe, is a good one for a main drain; but it sometimes happens that this cannot be obtained; nay, I have myself had to lay them nearly level, but in such cases special flushing arrangements are absolutely necessary. The usual system pursued by the "honest bricklayer" is to start from the main sewer, and lay each pipe to a fall by a straight-edge, with a piece of wood planted on one end. The size of this piece is determined by some rule, no doubt, — probably the rule of thumb, — a rule, I need scarcely say, of very wide and universal application. By means of these implements the drain gradually rises towards the house, but whether it hits the exact level, or falls below it, or is a foot or two higher, Providence alone can determine; at all events, I may say it is not so certain to work out right as were the two driftways through Mont Cenis. It not seldom happens that if the workman finds he has made a bungle, and got too high, he either carries his drain on a level or actually dips it the wrong way. And what does the architect do? He sees the end of the pipe at the proper level, and all the rest carefully covered up, and probably assumes that all is right.

There is another internal defect arising from this way of laying pipes: they are laid by the flanges, and the inverts, which are of primary importance, are left to take care of themselves. I have never seen, outside of my own practice, house drains laid by their inverts; but I consider this should, where the fall is limited, always be done. It is readily done, but the drain layer has to be taught, and it is a good deal of trouble to teach him, but not more than I hope any architect interested in the perfection of his work would undertake.

The method of proceeding is by fixing sight rails at the two ends of the drain, and sighting a boning rod, with a T piece at the top and a bent piece of iron or shoe to fit on to the invert at the bottom. This of course usually involves a correct system of levels and bench-marks, with the depths figured on the drawing.

The joints should in all cases be made in cement, half Portland cement and half sand is a good proportion; and special care should be taken to scrape out the cement on the inside of the joint so as to leave as perfect a tube as possible, free from lumps and obstructions. I need scarcely say half-bricks should not be left in the pipes, but I have not unfrequently found them there.

[1] From a paper by Mr. T. Mellard Reade, C. E., read before the Liverpool Architectural Society.

LIGHTNING-CONDUCTORS.

MR. R. H. BRUNTON, who has had considerable experience in fixing lightning-conductors in Japan, where thunder-storms are frequent and severe, says: "It is believed that a lightning-conductor, unless thoroughly insulated, is worse than useless, as it attracts the lightning without carrying it away safely. Now, an efficient lightning-conductor should afford greater facilities for the escape of the electric current to the earth than any thing which surrounds it. Electricity is attracted to the best conductor, and will not leave it in any appreciable quantity, to pass along a worse. The notion, therefore, that a flash of lightning will leave a copper rod whose extremity is sunk in good earth, in order to penetrate bricks and mortar, is most fallacious. On the contrary, I have found it necessary to connect the building at various intervals and the conductor by means of copper bats, and also to connect it with all exposed iron or other metal. To insulate a conductor is to prevent the escape from a wall of all the electricity which it collects during a storm. I have seen an iron erection placed on a stone base so charged that showers of sparks flew from it to the hands and clothes of men in its vicinity. The most important matter in fixing a conductor is to obtain good earth for its termination. This, while easy of accomplishment in the neighborhood of London, is attended with more difficulty in rocky localities; and where any doubt exists in regard to it, I would suggest testing the earth and the conductor by sending a current of electricity from a battery, through a circuit of which they form a portion. Copper rod or copper wire rope is the best material of which to make a conductor; and its upper extremity should always be some height above the highest point in a building, so as to enable it to gain possession of the lightning before it is attracted by the building. The conductor should be perfectly continuous, and sharp corners or angles should be avoided. Where rods are used, care should be taken that the ends are clean, and that they butt against

one another at their points of connection. It should be attached to the building by means of copper bats or staples, every eight or ten feet. My experience of lightning-conductors fitted up on these principles on nearly forty lofty buildings, which have been exposed to frequent violent thunder-storms, is that they afford an almost perfect immunity."

NOTES AND CLIPPINGS.

OBSTRUCTING A NEIGHBOR'S VIEW. — In the suit of William D. Shipman, assignee of William Butler Duncan, against Nathan P. Beers, Judge Barrett, in supreme court, chambers, decides that in no case, except by express covenant or very plainly implied purpose, can the owner of one piece of property prevent an adjoining owner from building on his own property so as to darken the windows of the other. The plaintiff owns a long lease on No. 1 Fifth Avenue, N.Y., from the Sailors' Snug Harbor. Defendant owns a similar lease on No. 3 Fifth Avenue. Both derive their title from James Boorman. When Boorman parted with his rights in No. 3, there was a building covering nearly the whole lot of No. 1, 39 feet x 100. On No. 3 the building only extended back 50 feet, and there were windows in No. 1 looking out on the court-yard of No. 3. Now the defendant proposes to build on No. 3 farther back; and plaintiff asks an injunction on the ground that there was an implied easement of lights granted by Boorman in parting with the premises as they then stood, to which his grantee is subject. Judge Barrett concludes that no such implication arises at law, and refuses an injunction.

A HIGH LEVEL. — The highest point yet attained by any railroad in this country has been reached on the summit of Laveta Pass, in the Sangre de Cristo Mountains, Nev., by the south-western extension of the Denver and Rio Grande Railroad. The altitude of the summit is 9,340 feet.

THE WASHINGTON MONUMENT. — At a meeting of the Washington Monument Association, July 5, Gen. Meigs submitted a plan to finish the present structure with a metallic spire 140 feet high, making a total height of 442 feet. The additional weight will be 4,147,000 pounds. Gen. Meigs also approved the plan of Larkin G. Mead to complete the monument by placing a colossal statue of Washington upon the present structure. This figure of Washington would be eighty-five feet in height, and of light hammered metal, so that the additional weight would be inconsiderable.

MONUMENT TO CAPT. COOK. — The granite obelisk which the English are to erect to the memory of Capt. Cook is now completed. It is to be placed upon a mound overlooking the beach at Hawaii where he was assassinated, and will be surrounded by thirty-two cannon fixed vertically in the earth and connected to one another by chains.

FALL OF A BUILDING. — On July 6, a building, while being removed from the site of the new Ashuelot depot at Keene, N.H., fell and fatally injured several of the men at work upon it.

SPARED BY THE GREAT FIRE. — The monument raised to the memory of John Donne, poet and divine, and executed from his own design, is the sole memorial of the former Cathedral of St. Paul which escaped destruction at the great fire. For many years it lay in the crypt unknown and neglected; but three or four years ago it was found and set up in its present position. Donne was born in 1640.

THE MAN OF ROSS AND HIS FAVORITE TREES. — The following anecdote is taken from a paper read before the Indian section of the Society of Arts not long ago: —

One other remarkable instance of mysterious or at least unaccountable growth has for many years attracted attention and surprise at Ross, in Herefordshire. The story, which has been related to me by several eye-witnesses, is this: The Man of Ross is a name and character which has been immortalized in the well-known lines of Pope. He was peculiarly partial to the elm-tree, many of which he had cherished with peculiar devotion. So long as he lived, no one presumed to interfere with his cherished favorites; but after his death several trees made their appearance at the door of the church, gradually forced their way into the interior, passed through the Man of Ross's pew, and grew up together inside the church, where they are still growing side by side, occasionally lopped when rising so high as to touch the roof.

WORK AT THE TROCADÉRO. — Because of the intense heat at Paris, the number of men employed at the building upon the Trocadéro has been temporarily reduced from 800 to 200.

STATUE OF VICTOR EMANUEL. — The equestrian statue of Victor Emanuel, recently obtained from Prince Doria in return for some concessions from the municipal government of Rome, has somewhat of a history. During the term of Prince Doria's mayoralty in the very commencement of the present government, he bethought himself of acquiring, on behalf of the municipality, the said statue, then undergoing completion in the studio of a Milanese artist. When the work was finished, the prince had gone out of office, and had to pay the 35,000 francs out of his own pocket. The treasure was wrapped up and placed in an inner court of the Doria palace; and when the prince, some years after, received permission to make certain alterations in the adjoining street, on payment of a sum of 50,000 lire or francs, he offered the statue in part settlement. The offer was accepted at cost price, namely, 35,000 lire, the remaining 15,000 in cash; but it is rumored that the authorities think they might have done better.

ENGLISH HOSPITAL AT PARIS. — The corner-stone of an hospital for the exclusive use of English people was lately laid at Paris. It is to contain forty beds.

BERLIN PNEUMATIC DESPATCH. — The proposed pneumatic despatch line in Berlin will have 26 kilometres of tube, and 15 initial stations. The wrought iron tubes have a clear breadth of 65 millimetres, and lie about one metre below the surface of the ground. The letters and cards which are to be forwarded have a prescribed size, and are enclosed in iron boxes, or cartridges, each of which can hold 20 letters or cards. In order that they may pack closely, they are covered with leather. From 10 to 15 cartridges are packed and forwarded at a time; behind the last cartridge is placed a box with a leather ruffle, in order to secure the best possible closure of the tube. At four of the stations are the machines and apparatus needed for the business. The forwarding of the boxes is effected either through compressed or rarefied air, or through a combination of the two. Steam-engines of about 12 horse power are used for the condensation or exhaustion of the air. Each main station has two engines, which drive a compressing and an exhausting apparatus, the steam for each engine being furnished by two boilers. Large reservoirs are employed both for the condensed and for the rarefied air. The former has a tension of about three atmospheres; the latter, of about 35 millimetres of mercury. The air, which is heated to 45° C. by the compression, is cooled again in double-walled cylinders which are surrounded by water. The velocity of the boxes averages 1,000 metres per minute, and a train is despatched every 15 minutes. Each of the two circuits is traversed in 20 minutes, including stoppages. The entire cost of the enterprise will be about 1,250,000 marks (about 300,000 dollars).

GERMAN CREMATION. — It appears to be a fact that the German society for the introduction of cremation has paid the sum of fifteen thousand marks to the town of Gotha, to cover the necessary expenses of erecting a cremation apparatus. Strict regulations have also been published by the police, ordering the examination by competent medical officers of all bodies submitted to be burned, so as to prevent cremation in all cases where the causes of death have not been properly ascertained. In order to still further guard against abuse, bodies sent to Gotha from abroad are to be subjected to the same or even more stringent rules, before being received for the operation. No corpse is to be burned unless the deceased has expressed a wish to that effect, and the relatives have approved.

STONE IMAGES ON EASTER ISLAND. — On one of the most remote islands of the Pacific — Easter Island — 2,000 miles from South America, 2,000 from the Marquesas, and more than 1,000 from the Gambier Islands, are found hundreds of gigantic stone images, now mostly in ruins, some 30 or 40 feet high, while some seem to have been much larger. The crowns on their heads, cut out of red stone, are sometimes 10 feet in diameter, while even the head and neck of one is said to have been 20 feet high. These once stood erect on extensive stone platforms, though the island has only an area of about 30 square miles, or considerably less than Jersey. Now as one of the smallest images — eight feet high — weighs four tons, the largest must weigh over 100 tons, if not much more; and the existence of such vast works implies a large population, abundance of food, and an established government. It is also maintained that this necessarily implies the power of regular communication with larger islands or a continent, and arts of navigation and civilization much higher than now exist in any part of the Pacific. Very similar remains in other islands scattered widely over the Pacific support this belief.

FIRE-PROOF PAPER. — Asbestos is found in large quantities in the valley of Aosta, in the Italian Alps. A priest of Arezzo, named Victoria del Corana, has experimented with it in the paper-mills of Tivoli, and is now making a fire-proof fabric at a cost of four francs per kilogramme. The most useful application which has yet been made of the paper is for the decorations of theatres.

GROUND-AIR AND THE DECAY OF THE DEAD. — There are burial-grounds in which a corpse decays completely in six to seven years, and others in which it takes twenty-five to thirty years. The regulations about a second occupation of a ground depend on this difference; and therefore towns with an equal population may be obliged to have burial-grounds of very different sizes. There are other circumstances of some influence on the process of decay, but the principal one is the amount of and the facility for the change of air in the soil. Rubble and sandy soils do the work much quicker than marl and clay soils. Striking experiences in this respect have been made on the French battle-fields, chiefly near Sedan, where a Belgian chemist, Louis Creature, had to disinfect the large dead-pits. The bodies were buried in chalk, quarry, rubble, sand, argillite, slate, marl, or clay soils, and the sad work lasted from the beginning of March to the end of June. In rubble the decay had taken place fully; but in clay the bodies were surprisingly well kept, even after a very long time, and even the features could be identified. As the processes of putrefaction and decay are intimately connected with the activity of certain low organisms which prey upon the dead, it is sufficiently clear that these organisms must thrive differently in different kinds of soil. A lively change of air and water in the ground appears to be of great influence in this respect; the more air in the ground, the richer the underground life. — *Popular Science Monthly.*

A TOMBSTONE. — A unique tombstone has been placed in the Yantic cemetery recently, to mark the grave of Mrs. David A. Wells. It is a boulder four feet in diameter, one side of which is faced, and bears the inscription, "And they rolled a stone to the mouth of the sepulchre."